

The Amateur in You, Part 1

What have you been pondering?



Antenna analyzer seeming malfunction

Building and experimenting with antennas is a favorite activity for many hams. It's very rewarding, especially when you use them to make a contact with somebody you don't already know. If you build them often, one thing you might find almost indispensable is an **antenna analyzer**, to verify that your design at least presents a close-enough impedance for normal amateur operation.



Whether you're using a RigExpert, an MFJ, the NanoVNA, or a full-featured VNA (and there are others), you're likely going to see some *accurate* readings when analyzing your antenna with one of these calibrated instruments. In spite of their accuracy, however, you might encounter different (sometimes *very* different) readings with the same instrument on the same antenna, possibly leading you to believe there's something wrong with the analyzer. In fact, with some experience you might just come to learn that your analyzer is actually functioning properly, and that it's *you* who requires the calibration.

You're attempting to display your antenna response to the stimulus provided by the analyzer. What actually occurs is the analyzer is displaying the response to your antenna, *combined with other things*. Due to (inductive or capacitive) **coupling**, your antenna will attach itself to nearby conductive objects (ductwork, power cords, computers, lights, nails, a human body, etc.), depending on the stimulus frequency. Also, due to RF reflections from conductive objects (same list, plus things such as dirt, stucco, aluminum siding, or a metal shed), your analyzer readings can vary depending on their proximity to your antenna.

The bottom line is that, when you analyze an antenna, the ideal test environment is to **a)** mount the antenna in a fixed (non-movable) location and position, **b)** mount the antenna in the same location and position each time, **c)** mount the antenna high enough to avoid coupling with anything conductive, **d)** keep the antenna many feet away from anything conductive, and **e)** remove your physical body from the antenna as far as you practically can. This is not always easy, because sometimes the coax, which is conductive, can play into the **interfering coupling**, throwing off the analyzer readings.

If you do your careful best to take multiple readings under seemingly identical circumstances, and still get different results, try taking the measurement again, but in *real-time SWR mode*. The RigExpert, MFJ, and NanoVNA support a setting that displays the SWR while you're connecting, moving, clearing, and raising the antenna. It can be quite revealing to find that, if the antenna is near your body, you can almost pick up your breathing by the SWR changes.

